

From: Amanda Scholes on behalf of Planning.Responses
Sent: 24 April 2019 10:41
To: Planning Scanning
Subject: FW: LU/56/19/DOC - Former Windroos Nursery, Worthing Road, Littlehampton, BN17 6LY
Attachments: a111089 windroos remediation strategy march 2018.pdf

From: Andrew Wood
Sent: 23 April 2019 12:23
To: Planning.Responses
Subject: FW: LU/56/19/DOC - Former Windroos Nursery, Worthing Road, Littlehampton, BN17 6LY

Pls upload to confirm error correction in original document.

Thank you,

Andrew Wood

Andrew Wood MRTPI | Senior Planning Officer, Planning Department, Arun District Council |
Location: 1st Floor, Arun Civic Centre, Maitravers Road, Littlehampton, BN17 5LF

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From: David Innes [REDACTED]
Sent: 11 April 2019 15:36
To: Kate Giddings
Cc: Andrew Wood; Christian O'Brien; [REDACTED]; Anna Appleton
Subject: Fwd: LU/56/19/DOC - Former Windroos Nursery, Worthing Road, Littlehampton, BN17 6LY

Hi Kate,

Further to your emails we would like to make the following comments inserted in red following your points below.

I trust that the clarifications and the additional report which was submitted to EH ([REDACTED] and Mathew Kennett who had dealt with original submission) on 22 March and the comments below in red allow you to formally discharge the remaining part of condition 5.

I will give you a call tomorrow afternoon to discuss.

Regards

David Innes

[REDACTED]
Blueprint Planning & Development Ltd
[REDACTED]

Good afternoon again,

Further to my below e-mail, could the consultant also please confirm whether the footer displayed from p34 in the main body of the report is merely a typographical error, as it reads December 2018, V1.

This is a typographical error. The correct date for the report is February 2019.

Many thanks,

Kate Giddings.

Kate Giddings | Senior Technical Officer, Environmental Health, Arun District Council | Location: Arun Civic Centre, Maltravers Road, Littlehampton, West Sussex, BN17 5LE

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From: Kate Giddings

Sent: 08 April 2019 16:43

To: Andrew Wood;

Cc: Planning.Responses; Anna Appleton

Subject: LU/56/19/DOC - Former Windroos Nursery, Worthing Road, Littlehampton, BN17 6LY

Good afternoon,

Having now reviewed WYG's Interpretative Ground Investigation Report V2 (ref.: A111089, dated February 2019) in relation to the above application, I have the following comments:

- ground gas monitoring was conducted in 2013; due to the age of the data, monitoring should be undertaken to ascertain the current gassing regime of the site in order to determine what, if any, remedial or protection measures are required

The ground investigation report submitted by WYG was undertaken with the objective of discharging Condition 5 section 3 of the planning condition in response to a letter dated 15th May 2014 from Arun District council which stated that Condition 5 sections 1 and 2 had been met but that further investigation was required to enable a remedial strategy to be finalised following removal of tanks. As section 1&2 are already discharged the focus can, in planning terms, only relate to section 3 of the condition we are seeking to discharge.

- the above report outlines several remedial options; please advise when a strategy has been decided

We prepared a separate remediation strategy for the site in March and this was submitted to EH section using the [REDACTED] copy attached for convenience.

- Condition 5 cannot be discharged until a suitable and effective remedial strategy has been implemented and (as per the fourth stage of the condition), a verification report provided, to include validation sampling where necessary.

The remediation strategy report referenced above addresses these issues, including recommendations for a materials management plan, discovery strategy and requirements for verification reporting. A verification report cannot be submitted to facilitate full discharge of Condition 5 until development works are complete.

Please note that any remedial measures are likely to include some, if not all, of the following:

- asbestos management plan
- materials management plan
- discovery strategy to address any previously unidentified potential contamination.

The above can be supplied as part of any remediation plan or as stand-alone documents.

Please do not hesitate to make contact using the below details, should the need require.

Kind regards,

Kate Giddings.

Kate Giddings | Senior Technical Officer, Environmental Health, Arun District Council | Location: Arun Civic Centre, Maltravers Road, Littlehampton, West Sussex, BN17 5LF

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Windroos, Littlehampton

Remediation Strategy Report

A111089

Dandara Limited

March 2019

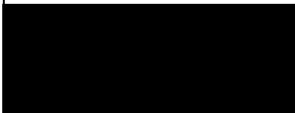
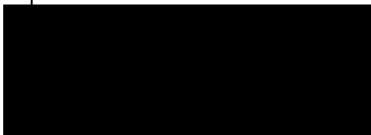
Prepared on behalf of WYG Environment Planning Transport Limited.

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD

WYG Environment Planning Transport Limited. Registered in England & Wales Number: 03050297
Registered Office: Arndale Court, Otley Road, Huddersley, Leeds, LS6 2UD



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Project:	Windroos, Littlehampton		
Client:	Dandara Limited		
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Prepared by:	Checked by:	Approved By:	
			
Sarah Roberts Senior Consultant	Ian Viney Associate Director	Ian Viney Associate Director	
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Contents

1.0 INTRODUCTION	1
1.1 Instruction.....	1
1.2 Brief	1
1.3 Scope.....	1
1.4 Site Status and Proposed Development	2
1.5 Limitations.....	3
2.0 SITE INFORMATION.....	4
2.1 Site Location and Situation	4
2.2 Previous Assessment	4
3.0 REMEDIATION STRATEGY	6
3.1 Risks Requiring Remedial Action	6
3.2 Excavation of Made Ground	7
3.3 Importation of Clean Capping Material.....	9
3.4 Materials Management Plan	10
4.0 REACTIVE REMEDIATION STRATEGY	12
5.0 VERIFICATION	13
FIGURES	15
APPENDICES.....	16



1.0 INTRODUCTION

1.1 Instruction

WYG was commissioned by Dandara Limited to prepare a Remediation Strategy for the site at Windroos, Littlehampton. The remediation strategy is intended to support the proposed residential development of the site and provide information to support the discharge of relevant planning conditions.

1.2 Brief

The purpose of the remediation strategy is to provide a proposed scheme for the mitigation and management of ground contamination risks at the site. To this end, the following scope of works was required:

- Assess the extent and distribution of contamination upon the site based upon data collated from previous site investigation reports including;
 - WYG. February 2019. Windroos, Littlehampton, Ground investigation Report on behalf of Dandara Limited.
 - Eastwood and Partners. June 2013. Geotechnical and Geo-environmental Site Investigation Report. On behalf of Taylor Wimpey Southern Counties¹.
- Identify a recommended remediation strategy to mitigate the risks;
- Identify suitable remediation validation criteria.

1.3 Scope

This Remediation Strategy summarises the principles, strategy and general method of approach to the proposed remediation works. It includes an outline of the proposed works required to:

- Reduce the risks posed by land contamination to site users and the environment to an acceptable level.
- Provide a defined criteria and validation procedure for demonstrating that the remediation works have been implemented to a suitable degree; and demonstration that the scheme will result in removal of potentially significant pollution linkages.

¹ WYG understand Dandara have full reliance on the 2013 report prepared by Eastwood and Partners.



- Provide a reactive remediation strategy in the event that any as-yet unidentified contamination is encountered during the development works such that it can be properly identified, characterised and remediated where necessary.

1.4 Site Status and Proposed Development

The site is currently unoccupied and forms part of the former Stuart Lyons Haulage Depot.

The proposed development includes the demolition of the current buildings to facilitate a residential development consisting of 91 dwellings and associated infrastructure. Conditional Planning Consent has been granted for the development by Arun District Council (Reference LU/229/10). Conditions 5, 6 and 7 relate to the identification, assessment and management of contamination on the site as summarised below.

- **Condition 5** relates to the assessment and remediation of the site for the presence of ground contamination as set out below. It requires that prior to the commencement of development, the following components of a scheme to deal with the risks associated with contamination of the site shall each be submitted to and approved, in writing, by the local planning authority:
 - A preliminary risk assessment to identify all previous site uses, potential contaminants associated with those uses, a conceptual model of the site indicating sources, pathways and receptors;
 - A site investigation scheme based on the above;
 - A detailed risk assessment based on the ground investigation results, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken;
 - A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.
- **Condition 6** requires that prior to occupation of the development a verification report demonstrating completion of the works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted and approved in writing by the local authority.



- **Condition 7** outlines the requirement for the identification and assessment of any contamination identified during the development works including the requirement to seek agreement for any additional works from the local authority.

The ground investigation reports outlined in Section 1.2 have been submitted in support of the partial discharge of Condition 5. This document aims to provide the additional information to support the discharge of Condition 5 and outline the information required to enable the future discharge of Conditions 6 and 7 during the development phase.

The site location plan is provided in Figure 1, with the site layout presented in Figure 2.

1.5 Limitations

This report has been prepared in accordance with the requirements of Dandara Limited. It is subject to the report conditions contained in Appendix A.

The information contained in this report is intended for the use of Dandara Limited and WYG take no responsibility for the use of the information by any third party or for uses other than that described in this report or detailed within the terms of engagement.



2.0 SITE INFORMATION

2.1 Site Location and Situation

The former site layout included a central depot area with a two-bay storage unit in the centre of the site. This is surrounded by a concrete and tarmac forecourt, with two empty residential buildings to the south. The entrance to the site is from the south east, via the A259, Worthing Road. An access track runs through the centre to the northern portion of the site. The surrounding areas of the site area are predominantly open ground.

2.2 Previous Assessment

Two phases of ground investigation have been undertaken on the site (Eastwood and Partners, June 2013, & WYG, 2019), the findings of which are summarised below.

- Made Ground was encountered in all WYG locations with the exception of WS04. General thickness of Made Ground varies between 0.05m and 0.60m, increasing locally to 1.45m associated with a former in ground tank and 3.40m in TP08 associated with a former inground structures.
- Additional stockpiles of Made Ground and topsoil are also present on the site in locations identified in Figure 2.
- Made ground deposits generally comprised brown to dark brown slightly gravelly fine to coarse sand and sandy gravelly clay with brick concrete and tile fragments.
- Underlying natural strata of the River Terrace Deposits were observed to consist of soft and firm brown sandy clay and gravelly clay. The New Pit Chalk Formation was encountered underlying the River Terrace Deposits in four locations at depths ranging from 2.90m and 3.80m.
- The risk assessment presented in the WYG Ground investigation report (WYG, 2019) identified that the Made Ground deposits present on the site pose a potential risk to future site users within the context of a residential development due to the presence of elevated concentrations of:
 - Aromatic hydrocarbons (C12-16 & C16-21);
 - Polycyclic aromatic hydrocarbons (PAH);



- Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene
- Lead;
- Asbestos.
- The identified contamination on the site is not considered to pose a significant risk to the wider environment.
- Within the context of site construction workers, the risks associated with short term exposure to on-site contamination can be controlled through the use of appropriate PPE/RPE and good on-site hygiene practices.
- Three samples from the Made Ground identified the presence of asbestos containing materials in the form of loose fibres and within material described the laboratory as 'material typical of bitumen'. Additional risk management procedures for construction workers are outlined in Section 3.1.1.



3.0 REMEDIATION STRATEGY

3.1 Risks Requiring Remedial Action

The objective of the Remediation Strategy is to ensure that all significant pollutant linkages relevant to the proposed development have been removed. The following table summarises the key pollutant linkages which have been identified.

Table 1 – Summary of Pollutant Linkages Requiring Remedial Action

Source	Pathway	Receptor	Remedial Action
Elevated concentrations of aromatic hydrocarbons, PAH, lead and asbestos within Made Ground	Direct contact, ingestion, inhalation	Site Construction Workers Future Site User	Either: Local excavation of Made Ground material from site and off-site disposal or re-use within areas of the site beneath areas of hardstanding / structures (subject to confirmation of suitability for re-use) Or: Importation of clean capping material to ensure that any Made Ground material is located at an adequate depth below final formation levels. Subject to the agreement of Arun District Council it is envisaged that the required depth of clean cover will be 600mm in private garden areas. Thicknesses within areas of public open space may be reduced to 450mm in conjunction with a no dig membrane, subject to agreement with Arun District Council.

In areas of the site where Made Ground is absent, no risk management procedures are considered necessary.

In addition to the management of the pollutant linkages noted above, the following management procedures are also recommended:

- Reactive Remediation Strategy setting out the procedures to identify, assess and manage any previously unidentified areas of contamination which are encountered during the development phase.



- If it is intended to re-use excavated soils within the development, a Material Management Plan, should be put in place to provide a record of material movement on the site in line with the guidance outlined in the CL:AIRE Code of Practice². This should be reviewed by a qualified person and a declaration should be provided to the Environment Agency prior to use of materials.
- The remediation strategy should be submitted and approved by the Planning Authority prior to development proceeding in accordance with the planning consent in conjunction with the relevant ground investigation reports.

3.1.1 Risks to Ground Workers

Risks to ground workers associated with the general made ground can, in general, be addressed as a precautionary measure through the use of appropriate personal protection equipment and the adoption of good practices on site.

It is recommended that any excavation or re-working of soils should only be undertaken under the requirements of this document, with appropriate health and safety measures in place. Such planning may include, but not be limited to the following measures:

- Toolbox talks for all ground workers to raise awareness of the nature and extent of identified contamination and potential presence of previously unidentified contamination on the site;
- Appropriate PPE/RPE;
- Dust suppression during ground works;

In the context of the presence of asbestos containing materials within the Made Ground deposits, construction workers should be made aware of the presence, extent and nature of asbestos containing materials in the Made Ground. During excavation of Made ground Materials, dust suppression should be utilised on site and soil movements minimised during periods of dry weather.

3.2 Excavation of Made Ground

Where Made Ground is present within the top 600mm of finished levels in private gardens (450mm of areas of public open space, subject to approval from Arun District Council) , or where site levels need to be reduced to facilitate the development, excavation should be

² CL:AIRE , March 2011. The Definition of Waste: Development Industry Code of Practice. Version 2.



undertaken within the requirements outlined below.

3.2.1 Excavation

The excavation of Made Ground materials will be undertaken under the guidance of a suitably trained and experienced banksman who is aware of the nature of the contamination present on the site and the potential for unidentified contamination to be encountered during the construction phase.

Excavation of this material will be undertaken on a visual basis until all Made Ground material has been removed or desired site levels are reached.

Following the completion of the excavation process the excavated Made Ground materials should either be:

1. Classified as suitable for use as fill on site in areas other than soft landscaping (residential gardens and areas of Public Open Space);
- or
2. Classified as surplus to requirements and disposed of at a suitable off-site facility.

3.2.2 Validation

On completion of the excavation process, areas of soft landscaping (private gardens and public open space) where excavation has been undertaken should be validated to confirm either:

1. All Made Ground Materials have been removed from these areas.
- or;
2. The residual Made Ground materials are covered by a cap of clean material as outlined in Section 3.3.

This validation process can be undertaken through the excavation of hand-dug inspection pits within individual residential plots and areas of public open space under the direction of a suitably trained and experienced Geo-environmental Engineer. Alternatively, during the construction phase, the effective removal of Made Ground from larger areas of the site can be confirmed through inspection of the formation level by a suitably trained and experienced Geo-environmental Engineer following the completion preparatory ground works.

3.2.3 Off Site Disposal

In the event that material is designated for off-site disposal, it will remain the responsibility of



the contractor to identify a suitable disposal facility for excavated material. All material removed from site should be fully documented within the structure of a formal Material Management Plan in line with the CL:AIRE Code of Practice.

3.3 Importation of Clean Capping Material

In areas of soft landscaping (private gardens and areas of public open space) where Made Ground remains present following the initial site clearance, a cover system should be constructed. The required thickness of capping should be a minimum of 600mm in private gardens. In areas of public open space, it may be possible to reduce the thickness of the capping system to 450mm in conjunction with a no-dig geotextile, subject to agreement with Arun District Council.

The cover system should be designed to provide long-term isolation of future site users from the Made Ground on the site, by provision of sufficient thickness of cover material to minimise the likelihood of future disturbance and mixing with the underlying Made Ground.

The clean cap can be constructed from a mixture of sub-soil, topsoil and soil-making materials in line with requirements of the proposed development. The following sources are considered suitable for the use within the proposed capping system.

- Imported topsoil / sub soil derived from uncontaminated sites;
- Site-won natural strata.

All materials incorporated within the capping system should be demonstrated to conform to the chemical import criteria outlined in Appendix C and meet the criteria outlined within the Materials Management Plan for the site.

3.3.1 Testing of Imported materials

Soils for import should be sourced from uncontaminated sites and tested at an approximate rate of 1 sample per 200m³. Details of each proposed source, the supplier and associated chemical analysis should be independently validated by a suitably qualified and experienced Geo-environmental engineer independent of the contractor prior to import. The analytical suite should be not less than that listed in Appendix B, with consideration given to the need for any additional testing based on the origin. In addition, imported soils shall be visually free of foreign materials such as plastics, glass, metals, tarmac, etc.

The Residential with Plant Uptake Acceptance Criteria in Appendix C will be applied, based on



individual sample results except where soils are sourced from a single large site, where statistical analysis may be appropriate.

3.3.2 Cover verification

Post-remediation verification of cover thickness will be required.

Verification testing of the cover thickness once it has been placed on site is proposed across the private gardens and open space area through the excavation of hand dug pits. This will be undertaken under supervision from a suitably qualified and experienced geo-environmental engineer independent of the contractor. This will then be used, in conjunction with pre- and post-placement level surveys, to demonstrate that the required thickness of cover has been placed in all areas of soft landscaping.

Any non-compliance with the remediation strategy requirements will be discussed as necessary with the local authority and an acceptable resolution agreed.

3.4 Materials Management Plan

It is recommended that a 'Materials Management Plan' (MMP) or similar protocol is prepared in accordance with CL:AIRE Code of Practice, setting out proposals for the appropriate re-use of materials at the site within the proposed development. The need for off-site disposal of materials potentially suitable for retention will consequently be minimised. It is possible that surplus materials may be available for re-use at other sites, subject to volumetric assessment.

In accordance with the Code of Practice, the MMP will provide:

- A description of the materials with regard to potential use and quantity, underpinned by an appropriate risk assessment.
- Details of where and how materials will be stored.
- Details of proposed final destination and use, and how they will be tracked.
- Contingency arrangements required prior to movement (eg. out-of-specification material; surplus; identified persons responsible, etc.)

Based on the risk assessment presented in the previous ground investigation report (WYG, 2019) the Made Ground is unsuitable for use within the top 600mm of areas of soft landscaping within the proposed development (450mm in areas of Public Open Space). However, this material is deemed suitable for use beneath areas of hardstanding and / or buildings, assuming



it is geotechnically suitable and not present in excess quantities.

The material may be excavated, processed if necessary, to remove any unsuitable material, and re-placed within the site in order to achieve the required level profile, subject to cover requirements in areas of soft landscaping. Made ground may also be sourced from services and foundation excavations. Any unsuitable materials will be treated as waste and disposed of off-site in accordance with relevant regulations.

The MMP will include quantitative assessment of material volume availability and requirements (mass balance calculations). Only those materials necessarily required for the site development works will be excepted from classification as waste.

The draft MMP will be subject to scrutiny by an appropriately qualified and experienced 'Qualified Person', as defined in the Code of Practice, who must not otherwise be directly involved with the remediation scheme. On completion of the works, and of a Verification Report to demonstrate that materials have been handled and placed in accordance with the MMP, the Qualified Person will be required to sign a Declaration. The content of the Verification Report will meet the requirements of the Code of Practice, as set out in Section 3.25 therein.

The Contractor will be responsible for ensuring that materials are treated and used as set out in the MMP. Any deviations from the MMP will be recorded in the Verification Report.



4.0 REACTIVE REMEDIATION STRATEGY

In common with all brownfield sites, there is potential for other contamination to be present within the soils beneath the site over and above that identified during the site investigation, for example beneath buildings/structures on site which were inaccessible during the original site investigation. Assessment based on trial pit/borehole data cannot provide a complete picture and as such, a detailed pro-active 'watching brief' should be maintained during excavation works. The Contractor for the works should be responsible for providing an experienced banksman to observe and control excavations. In addition, the supervising person must be suitably trained and experienced in order to identify the presence of other visible or olfactory evidence of contamination including hydrocarbons and asbestos.

In the event that evidence of previously unidentified contamination is encountered during the groundworks the following procedures should be implemented as a minimum.

- Potentially contaminated materials should be separately stockpiled and segregated on site.
- The contractor should seek further specialist advice from a suitably qualified and experienced Geo-environmental Engineer independent of the contractor.
- The materials should be assessed for the suitability for retention and re-use on site.
- The extent of any excavations should be validated to confirm all impacted materials have been removed and residual materials are suitable for retention on site.
- The Remediation Strategy Document should be updated, where necessary.
- In the case of asbestos, the identification of any more hazardous forms of asbestos (ie. materials other than asbestos cement/ bound asbestos) might trigger requirements for alternative handling requirements, in compliance with the Control of Asbestos at Work Regulations and other provisions including the requirement for an Asbestos Management Plan.

Any findings of potentially contaminated materials should be reported to the local authority and included within the Verification Report for the works and documented within the Materials Management Plan.



5.0 VERIFICATION

An integral part of the remediation strategy proposed for the site involves suitable monitoring of the works to ensure they are undertaken as specified, to demonstrate the achievement of the remediation objective and to document all aspects of the remediation work.

The remediation works will be controlled by the appointed contractor. The following records should be maintained on site and provided as necessary to the regulatory authorities for approval:

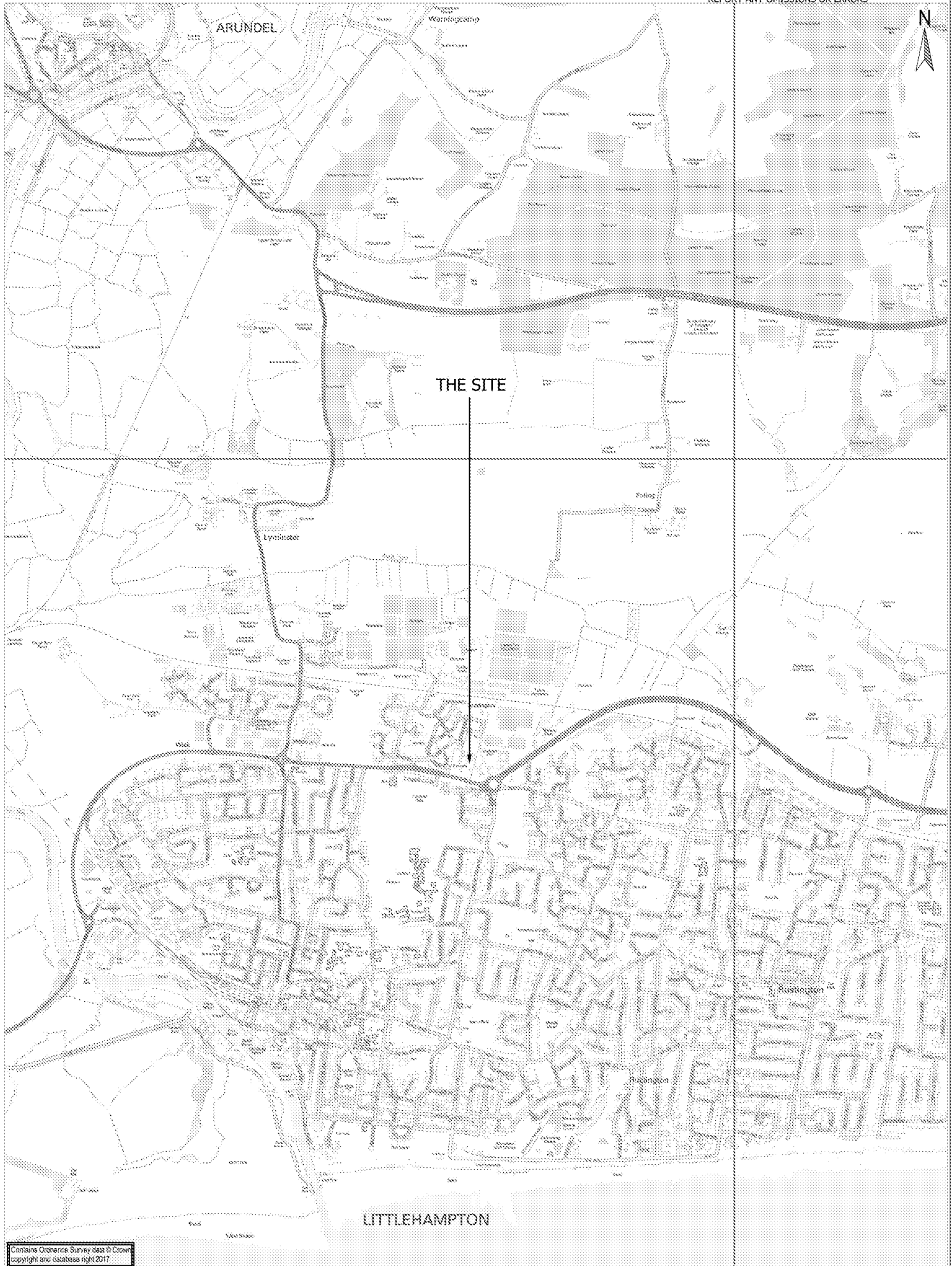
- Details of the actions taken to store, contain, treat, dispose or re-use any contaminated materials encountered during groundworks deemed unsuitable for use on the site;
- Validation records from the extent of any excavations, confirming the residual material is suitable for retention on the site;
- Results of any additional contamination testing in the event that unexpected contamination be identified during ground works, including laboratory quality assurance accreditation information;
- Results of testing of all soils proposed for import, including information on the source location and quantity imported. Laboratory test results are to be approved by a competent person before the soils are brought to site.
- Chain of custody documentation for any soils imported to site;
- Records of disposal of any unsuitable soils or hazardous / contaminated materials, including waste transfer documentation if applicable;
- Records of health, safety and environmental controls and variations to the original strategy / specification;
- Copies of all relevant correspondence with regulatory authorities during the course of the works;
- Confirmation that Made Ground is not present within the top 600mm of final ground levels in private gardens / 450mm in areas of public open space (subject to approval from Arun District Council) through either;



- Record of post-remediation verification thickness of soil (if applicable) within areas of soft landscaping or;
 - Confirmation of the removal of Made Ground.
- Photographic records as required.



FIGURES



Contains Ordnance Survey data © Crown
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REV	DESCRIPTION	BY	CHK	APP	DATE

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2062 5200
FAX: +44 (0)29 2065 3231



DANDARA LTD (SOUTHERN)

Project:
WINDROOS, LITTLEHAMPTON

Drawing Title:
SITE LOCATION PLAN

Scale	Drawn	Date	Checked	Date	Approved	Date
A4	PP	08.02.19	JA		CA	

Project No.	Sheet	Type	Drawing No.	Revision
A111089	CDF	N	1	00

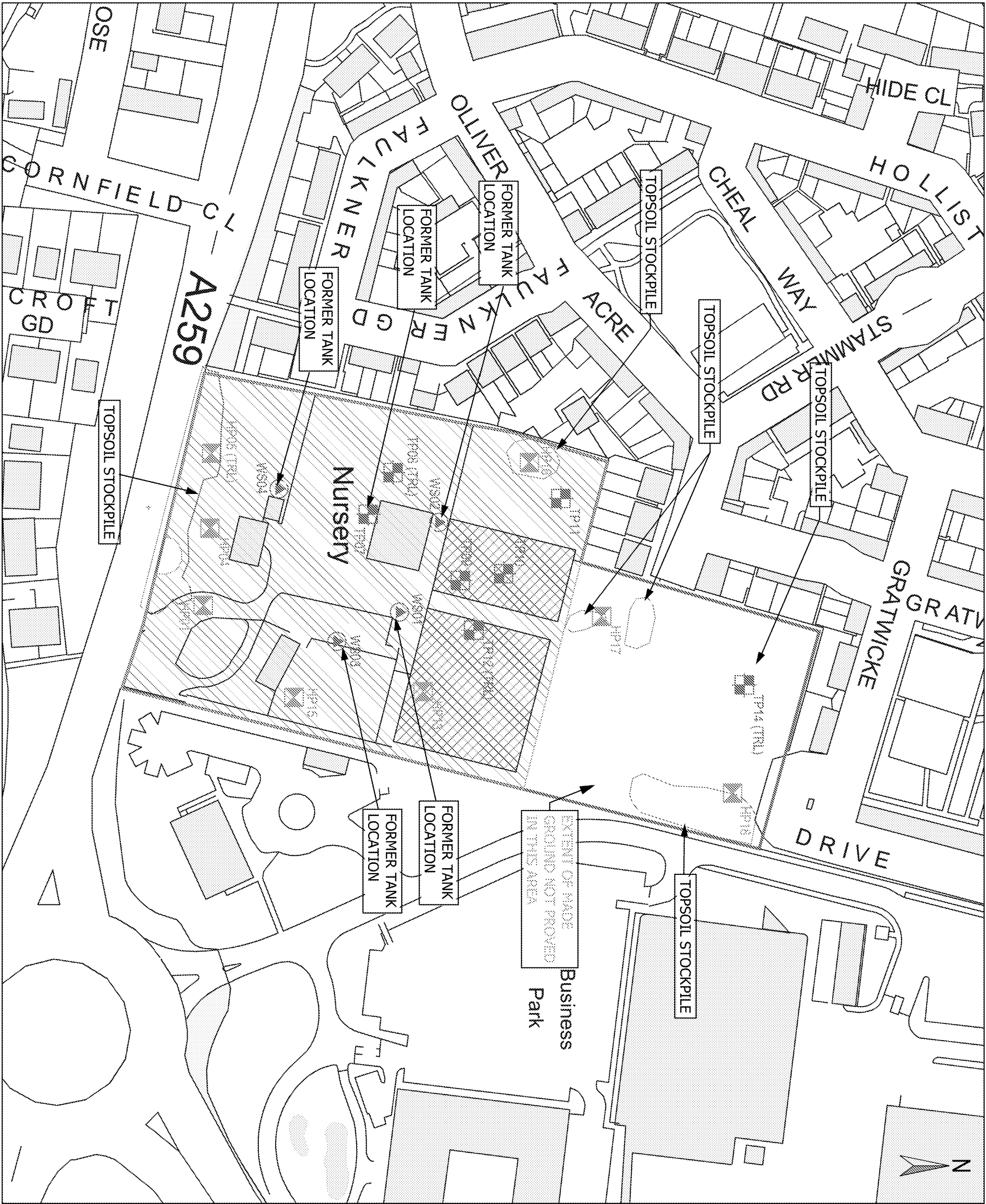
LEGEND:

 INDICATIVE TRIAL PIT LOCATIONS

 INDICATIVE HAND PIT LOCATIONS

 INDICATIVE WINDOW SAMPLE
LOCATIONS

 APPROXIMATE EXPECTED EXTENT OF
MADE GROUND BASED ON EASTWOOD
AND PARTNERS AND WYG GROUND
INVESTIGATION FINDINGS.



REV	DESCRIPTION	BY	CHK/APP	DATE
Client:				

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Project:
WINDROOS, LITTLEHAMPTON

Drawing Title:

INDICATIVE SITE INVESTIGATION LAYOUT PLAN

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
Project No.	PP	08.01.19	CA	16.01.19	IV	16.01.19	
Revision	A111089	CDF	N		2		00



APPENDICES



Appendix A – Report Conditions



APPENDIX A - REPORT CONDITIONS

GROUND INVESTIGATION

This report is produced solely for the benefit of Dandara Limited and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.



Appendix B – Soils Testing Suite for Imported Soils



Appendix B - Soils Testing Suite for Imported Soils

Suite for use with additional screening investigation and for soils for import.

pH	<i>Dependant option ¹</i>
asbestos	Aliphatic EC 5-6
Arsenic	Aliphatic EC >6-8
Cadmium	Aliphatic EC >8-10
Chromium(VI)	Aliphatic EC >10-12
Copper	Aliphatic EC >12-16
Lead	Aliphatic EC >16-35
Mercury	Aliphatic EC >35-44
Nickel	Aromatic EC 5-7 (benzene)
Selenium	Aromatic EC >7-8 (toluene)
Zinc	Aromatic EC >8-10
PAHs:	Aromatic EC >10-12
Acenaphthene	Aromatic EC >12-16
Acenaphylene	Aromatic EC >16-21
Anthracene	Aromatic EC >21-35
Benz(a)anthracene	Aromatic EC >35-44
Benzo(a)pyrene	
Benzo(b)fluoranthene	
Benzo(ghi)perylene	
Benzo(k)fluoranthene	
Chrysene	
Dibenz(ah)anthracene	
Fluoranthene	
Fluorene	
Indeno(123cd)pyrene	
Naphthalene	
Phenanthrene	
Pyrene	
TPH (C8-C40) ¹	

¹ If a screening total hydrocarbons result exceeds 500mg/kg, detailed TPH CWG analysis may be undertaken to assess risk. Any soils showing visible or olfactory evidence of contamination will be rejected.



Appendix C - Contamination Assessment Criteria



Appendix C - Contamination Assessment Criteria

(Residential with plant uptake, 1% Soil Organic Matter where applicable)

Determinand	Units	Soil Screening Value	Derivation Tool
pH		<5, >9	
Asbestos	%	Presence	
HEAVY METALS/METALLOIDS			
Arsenic	mg/kg	37	C4SL
Cadmium	mg/kg	22	C4SL
Chromium (III)	mg/kg	910	CIEH/LQM S4ULs
Chromium (VI)	mg/kg	21	C4SL
Lead	mg/kg	200	C4SL
Mercury (Inorganic)	mg/kg	40	CIEH/LQM S4ULs
Nickel	mg/kg	180	CIEH/LQM S4ULs
Selenium	mg/kg	250	CIEH/LQM S4ULs
Beryllium	mg/kg	1.7	CIEH/LQM S4ULs
Boron	mg/kg	290	CIEH/LQM S4ULs
Vanadium	mg/kg	410	CIEH/LQM S4ULs
Copper	mg/kg	2,400	CIEH/LQM S4ULs
Zinc	mg/kg	3,700	CIEH/LQM S4ULs
GENERAL INORGANICS			
Easily Liberatable Cyanide (free)	mg/kg	24	WYG Acute Effects to Infant 1 dose 5g of soil
US EPA PRIORITY PAHs ^{Note 9}			
Acenaphthene	mg/kg	210	CIEH/LQM S4ULs
Acenaphthylene	mg/kg	170	CIEH/LQM S4ULs
Anthracene	mg/kg	2,400	CIEH/LQM S4ULs
Benzo(a)anthracene	mg/kg	7.2	CIEH/LQM S4ULs
Benzo(b)fluoranthene	mg/kg	2.6	CIEH/LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	CIEH/LQM S4ULs
Benzo(g,h,i)perylene	mg/kg	320	CIEH/LQM S4ULs
Benzo(a)pyrene ^{Note 9}	mg/kg	5	C4SL, CLEA v1.071 model
Chrysene	mg/kg	15	CIEH/LQM S4ULs
Di-benzo(a,h)anthracene	mg/kg	0.24	CIEH/LQM S4ULs
Fluoranthene	mg/kg	280	CIEH/LQM S4ULs
Fluorene	mg/kg	170	CIEH/LQM S4ULs
Indeno(1,2,3-cd)pyrene	mg/kg	27	CIEH/LQM S4ULs



Determinand	Units	Soil Screening Value	Derivation Tool
Naphthalene	mg/kg	2.3	CIEH/LQM S4ULs
Phenanthrene	mg/kg	95	CIEH/LQM S4ULs
Pyrene	mg/kg	620	CIEH/LQM S4ULs
PHENOLICS			
Phenol	mg/kg	120	CIEH/LQM S4ULs
TPH			
TPH Aliphatic >C5-6	mg/kg	42	CIEH/LQM S4ULs
TPH Aliphatic >C6-8	mg/kg	100	CIEH/LQM S4ULs
TPH Aliphatic >C8-10	mg/kg	27	CIEH/LQM S4ULs
TPH Aliphatic >C10-12	mg/kg	130	CIEH/LQM S4ULs
TPH Aliphatic >C12-16	mg/kg	1,100	CIEH/LQM S4ULs
TPH Aliphatic >C16-35	mg/kg	65,000	CIEH/LQM S4ULs
TPH Aliphatic >C35-44	mg/kg	65,000	CIEH/LQM S4ULs
TPH Aromatic >EC5-7 (Benzene)	mg/kg	0.2	C4SL App D, CLEA v1.071 model
TPH Aromatic >EC7-8	mg/kg	130	CIEH/LQM S4ULs
TPH Aromatic >EC8-10	mg/kg	34	CIEH/LQM S4ULs
TPH Aromatic >EC10-12	mg/kg	74	CIEH/LQM S4ULs
TPH Aromatic >EC12-16	mg/kg	140	CIEH/LQM S4ULs
TPH Aromatic >EC16-21	mg/kg	260	CIEH/LQM S4ULs
TPH Aromatic >EC21-35	mg/kg	1,100	CIEH/LQM S4ULs
TPH Aromatic >EC35-44	mg/kg	1,100	CIEH/LQM S4ULs
TPH Aliphatic & Aromatic >EC44-70	mg/kg	1,600	CIEH/LQM S4ULs
BTEX			
Benzene*	mg/kg	0.2	C4SL App D, CLEA v1.071 model
Toluene	mg/kg	130	CIEH/LQM S4ULs
Ethylbenzene	mg/kg	47	CIEH/LQM S4ULs
m-Xylene	mg/kg	59	CIEH/LQM S4ULs
o-Xylene	mg/kg	60	CIEH/LQM S4ULs
p-Xylene	mg/kg	56	CIEH/LQM S4ULs
Xylenes (mixed isomers)	mg/kg	56	CIEH/LQM S4ULs